

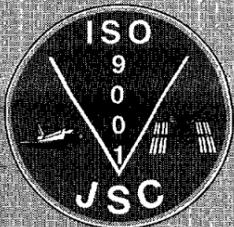
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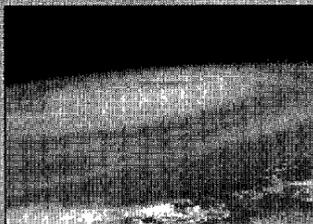
The first crew of the International Space Station talks about January 1999 flight. **Page 2**



JSC employees help students build solar powered race cars. **Page 3**



ISO 9000 Director Lee Norbraten discusses JSC's quality system. **Page 4**



A special hurricane section aims at helping employees prepare for 1997 season. **Page 5**



STS-84 crew members capture Mir memories in pictures. **Page 7**



Mona White celebrates 30 years of nursing JSC employees. **Page 9**

JSC provides land for intermediate school

Unique agreement creates local, federal partnership

JSC will begin a collaborative education venture to locate a Clear Creek Independent School District intermediate school on the premises of JSC, Director George Abbey and Superintendent John Wilson announced last week.

The agreement represents a "first of its kind" partnership between a NASA center and a local school district, and provides the opportunity to

combine the scientific and technical expertise of JSC with the teaching skills of the Clear Creek Independent School District faculty, furthering development of the science and mathematics curriculum. Possibilities for educational program development are still in the planning stages.

"NASA is about the future and the key to the future is really science

and technology and the key to that is education," Abbey said. "It's an excellent example of a cooperative activity on the part of the federal government, the Clear Creek Independent School District and the community. We're very pleased to be a part of it, and having a school in close proximity to Space Center Houston and the Johnson Space Center is going to be a good thing."

"The mission of the CCISD is about developing human talent and human potential. The education of our young people is what is critically important," Wilson added. "We have unbelievable talent among our young people and in our community and this is going to be an opportunity for us to enhance learning opportunities for those students as

Please see **JSC**, Page 10



JSC Photo 97-06868 by Steve Candler

From left, Bobby Alford of Baylor and Laurence Young of MIT, accept congratulations from JSC's Charles Sawin, Space and Life Sciences' contractor officer' technical representative for the institute and Space and Life Sciences' Associate Director John Rummel after signing an agreement that establishes a National Space Biomedical Research Institute.

Baylor to guide Space Biomedical Research Institute

NASA and the Baylor College of Medicine, Houston, will establish a National Space Biomedical Research Institute to conduct the focused biomedical research necessary to support human health in the exploration and development of space.

JSC will sponsor the institute and Baylor will lead the consortium of premier academic and research facilities across the country. The agreement is for five years with three five-year extensions. The total value of the 20-year agreement is approximately \$145 million.

NASA identified the concept of a science institute as a means of maintaining the scientific excellence of its applied biomedical research through a greater involvement of the scientific community in NASA's overall research program.

The members of the National Space Biomedical Research Institute consortium are: Baylor College of Medicine; Harvard Medical School, Cambridge, Mass.; Johns Hopkins University's School of Medicine and Applied Physics Laboratory, Baltimore and Laurel, Md.; Massachusetts Institute of Technology, Cambridge, Mass.; Morehouse School of Medicine, Atlanta; Rice University, Houston; and Texas A & M University, College Station.

The specific objectives of the Institute include:

- Implement a research plan that will lead to the knowledge and technologies required for long-duration space flight, including specific countermeasures;
- Ensure the dissemination of knowledge to the scientific community;
- Facilitate science community access to NASA's

Please see **BIOMEDICAL**, Page 10

Area code changes effective today

Southwestern Bell will put the new 281 area code for JSC into effect Friday and employees are encouraged to prepare for 10-digit dialing.

The change requires seven digits for calls within the 281 area code and 10 digits for calls to the 713 area code.

Southwestern Bell will provide a "Call Intercept Message" for two months. Misdialed calls will be intercepted and a recorded message will inform users which area code to use

to complete their calls. Emergency numbers will not change, and the toll-free calling radius will not change.

All users should review their programmed telephone numbers and make the necessary changes. Some devices, like fax machines distribution lists and the speed dial feature of phones, must be reviewed. Dial-in software must be modified to include the 281 area code when dialing in from non-281 off-site locations.

Grand opening for new Exchange Store coming up

By Karl Schuler

When the new Bldg. 3 Exchange Store hosts its grand opening June 16-20, customers will find a UPS package counter and fresh floral arrangements along with new merchandise that continues to arrive.

The NASA-JSC Exchange reports that customers are commenting that they like the product mix and convenience, and are looking forward to

the new services.

During the grand opening, the Exchange plans to have free daily drawings for merchandise which will include a JSC logo golf shirt, an autographed "Orbit" book, Astro-world tickets, plus other surprises. Employees just need to stop by the Bldg. 3 store and put their names "in the hat."

Customers also will find daily dis-

counts on selected merchandise in both the Bldg. 3 and 11 stores. For example, on Monday, June 16, T-shirts and golf shirts will be discounted; and on Tuesday, videos will be on special; other merchandise discounts will follow for the rest of the week. Paying customers will receive special coupons for future purchases.

In addition, there will be a silent

auction for a computer during the week of the grand opening. The Exchange obtained a computer during its computer fair last winter and plans on setting the opening bid very low to attract a lot of attention. Interested employees should stop by the Bldg. 3 retail store during grand opening for more information or to place a bid.

Please see **CAFETERIA**, Page 10

Crew says sixth docking mission like 'clockwork'

The Space Shuttle *Atlantis*, carrying seven astronauts including Jerry Linenger, glided to a delayed, but smooth landing May 24 at Kennedy Space Center to wrap up the sixth docking mission to the Russian Mir Space Station and delivery of astronaut Mike Foale for the start of his four month tour of duty.

It was the eighth straight shuttle landing at the Florida spaceport.

After passing up the first landing opportunity because of clouds over KSC, Commander Charlie Precourt and Pilot Eileen Collins guided *Atlantis* to a textbook touchdown at 8:28 a.m. CDT to wrap up a 3.6 million mile mission to bring Jerry Linenger home after 132 days in

space. Linenger's voyage, which began with his launch to Mir in January, was the second longest single space flight in U.S. history.

"This one went like clockwork," Precourt said during homecoming ceremonies at Ellington Field. "It was an incredible demonstration of the kind of teamwork that the whole NASA team has learned to put together, especially with our Russian and international partners. I think it has demonstrated that we're ready to go do the International Space Station."

"What really worked the best for us was the way we communicated," he continued. "This team here of

Please see **LINENGER**, Page 10



NASA Photo STS084-704-015

A joint crew portrait shows from left, front, Jerry Linenger, Vasili Tsibliev, Charlie Precourt, Alexander Lazutkin and Mike Foale, and back, Ed Lu, Eileen Collins, Jean-François Clervoy, Elena Kondakova and Carlos Noriega.

Foale digs into his work as microgravity farmer

Astronaut Mike Foale is three weeks into his four-month stay on the Russian Mir Space Station, settling into his new home on orbit while setting up the hardware he'll use to conduct scientific investigations.

Today is the 21st day of Foale's four and a half months as a Mir crew member. Mir 23 Commander Vasili Tsibiliev and Flight Engineer Alexander Lazutkin are in their 117th day of their six-month mission.

Foale spent his second week aboard setting up special containment areas in which 64 black-bodied beetles, transported up on STS-84, will be exposed to special lighting conditions in a study of the effects of those conditions on the insects' circadian timing system while in microgravity. He's also preparing the Greenhouse Facility, which houses a biology

experiment on plant growth in microgravity.

"We're doing a seed-to-seed experiment, which has never been done before in space, taking rape seed, which is related to broccoli, and growing them over a cycle of 30 to 40 days, three times we hope during my mission," Foale said. "I never was a farmer in my childhood, but I'm ready to be one now."

Foale also has been working with his cosmonaut colleagues on station maintenance. This week the Mir crew conducted repairs to a cooling loop in the station's Kvant-1 module, continuing a job that began back in March. Once that loop is confirmed to be operating properly, it will provide cooling for

the station's carbon dioxide removal system, which has been operating normally, but without cooling, since mid-April. The next major maintenance task for the cosmonauts will be installing the new Elektron oxygen generation system brought to Mir with Foale.

Astronaut Jerry Linenger let out "whoops" of joy as *Atlantis* neared the Kennedy Space Center Shuttle Landing Facility runway, bringing his four and a half months on orbit to a close May 24.

Linenger will spend the next several weeks in debriefings while working closely with his flight surgeons to assist his body's readjustment to gravity.

"I felt way better than I thought I would feel.



FOALE

JSC selects Space Ops contractors

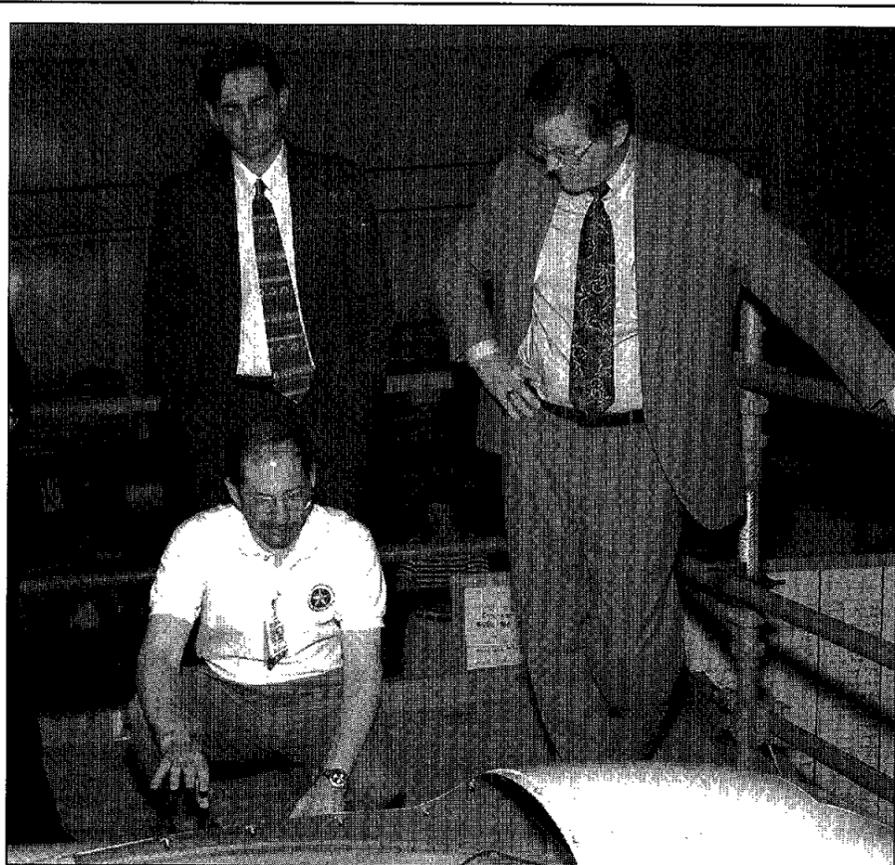
First step in merging NASA's command, tracking networks

JSC has selected Boeing North American Inc. Space Systems Division and Lockheed Martin Space Mission Systems and Services Inc., both of Houston, for award of fixed-price contracts for Phase 1 of the Consolidated Space Operations contract.

JSC is the lead center for NASA space operations under the direction of John O'Neill and the Space Operations Directorate.

The contract is the first step in a planned consolidation of NASA's communications, command and control and deep space tracking resources. The intent of this initiative is to achieve cost savings by reducing the management structure and realizing economies possible through private sector competition and innovation.

Each contract is for \$4 million over a period of eight months, ending January 16, 1998. No other companies submitted proposals. The Phase 1 study will lead to the development of an integrated operations architecture for NASA space operations. Each contractor will independently develop an architecture.



X-TREME INTEREST—U.S. Rep Joe Barton, R-Texas, right, gets a look at the new X-38 spacecraft being designed as an assured crew return vehicle for the International Space Station. In Bldg. 220, X-38 Project Manager John Muratore explains details about the spacecraft's design, which is based on old experimental lifting body designs. Standing with Barton is his legislative aide, Brandon Steinmann. U.S. Rep. Kevin Brady, R-Texas, accompanied Barton on the May 5 fact-finding trip to JSC.

JSC Photo 97-06615 by Steve Candler

First space station commander says integration key

The commander of the first International Space Station crew says "integration" will be the main objective of his 1999 mission with two Russians.

Commander Bill Shepherd, Soyuz Commander Yuri Gidzenko and Flight Engineer Sergei Krikalev—all veteran space travelers—will have their work cut out for them when they launch aboard a Russian Soyuz spacecraft in January 1999 to begin a permanent human presence aboard the station.

"We're talking about an unprecedented event here, where we're assembling large pieces of a vehicle that for a lot of good technical and programmatic reasons we can't fully assemble and check out on the ground," Shepherd said during the crew's first news conference. "The engineers and designers are going to do a good job giving us hardware that's workable, but we have to have a profound understanding of what the hardware is trying to do, because I anticipate not everything is going to go as planned."

Shepherd, Gidzenko and Krikalev are scheduled to follow by seven months the first component of the station, targeted for launch in June 1998. The crew began training last year for a flight that is to exceed four months.

Shepherd, who has made three space shuttle flights as a mission specialist and was deputy manager of the International Space Station Program, said training activities are picking up speed as the crew learns about American and Russian hardware components they will be integrating.

Krikalev, with two flights on Mir and one flight aboard the space shuttle under his belt, said he expects some difficulties and that changes in the station assembly sequence are to be expected.

"My personal feeling is that we should expect some problems. Space flight is still testing equipment, and in this case we put together very many new systems and they are going to operate a little bit differently," Krikalev said. "Changing the recent plans makes our flight more interesting, because the initial plan was for us to fly in the configuration (where) only the Service Module, FGB, and the Node (are present)," Krikalev said. "But now, right in the middle of our flight—because our flight was delayed—the lab will come in the middle of our flight, so we will have a lot of interesting things to do."

Gidzenko, a colonel in the Russian Air Force, a Mig-23 pilot, and a veteran of the Euromir-95 mission, said titles won't mean much during the mission.

"I am glad to be on the first crew of the International Space Station," Gidzenko said. "It doesn't matter who will be commander or flight engineer or pilot. We will work together and try to do our best."



Shepherd



Krikalev



Gidzenko

Ukrainian payload specialist to fly on STS-87

Col. Leonid Kadenyuk will be the first Ukrainian to fly on a U.S. space shuttle as the primary payload specialist for the fourth U.S. Microgravity Payload flight scheduled for a November 1997 launch on *Columbia* and STS-87.

The announcement was made May 16 as the first session of the U.S./Ukraine Binational Commission convened at the White House. The Commission is co-chaired by Vice President Al Gore and Ukrainian President Leonid Kuchma.

NASA also named another Ukrainian, Dr. Yaroslav Pustovyi, to serve as an alternate. As an alternate payload specialist, Pustovyi will undergo the same training as Kadenyuk and will be ready to serve on the mission crew if necessary.

Kadenyuk will conduct the Collaborative Ukrainian Experiment, a series of 11 shuttle middeck experiments focusing on the effects of microgravity on plant growth and pollination.

The project resulted from the November

1994 summit meeting between President Bill Clinton and Ukrainian President Leonid Kuchma. At that time, the two presidents signed the Agreement Between the United States of America and Ukraine on Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes and announced that a Ukrainian representative would fly on a future space shuttle mission.

U.S. and Ukrainian scientists will collaborate on the plant experiments to be carried out by the Ukrainian payload specialist during the flight. The 11 investigations, which use the shuttle's Plant Growth Facility and Biological Research in Canisters hardware, consist of five primary and six secondary experiments.

Six U.S. and 16 Ukrainian principal investigators are collaborating on the experiments, which will study the effect of microgravity on pollination, fertilization and flowering of plants and seedlings. The research also furthers the study of previ-

ously observed abnormal growth and developmental phenomena involving plants in space.

Kadenyuk was selected as a Russian cosmonaut in 1976. He has trained for and studied systems for the Soyuz, Soyuz-TM, MTKK, Buran, and Space Stations Salyut and Mir. He was born in the village of Kiishkovtsiy in the Khotinsky Region of the Chernovitsky District. He is employed by the Kiev Botanical Institute of the National Academy of Sciences of Ukraine.

Pustovyi is a graduate of the Military Space-Engineer Academy, and received a doctorate in Radio Physics from Kharkiv State University. He is employed by the Institute of Magnetism at the National Academy of Sciences of Ukraine.

The other members of the STS-87 crew are Commander Kevin Kregel, Pilot Steven Lindsey and Mission Specialists Winston Scott, Kalpana Chawla and Takao Doi.

Columbia work on track to set processing flow record

By Kyle Herring

With *Atlantis* back home following its sixth mission to dock with the Mir Space Station, mission planners turn their attention to preparations of *Columbia* for the reflight of the Microgravity Science Laboratory, which was cut short last month.

Columbia had to make an early return to Earth after one of its fuel cells experienced voltage shifts that were not fully understood at the time.

The MSL-1 reflight, labeled STS-94, will be the 23rd mission of *Columbia* and the 85th since the shuttle began flying. Launch currently is targeted for 1:37 p.m. CDT, July 1, at the opening of a two and a half hour launch

window. Flight managers will meet June 19 to review preparations and select the actual launch date.

Vehicle processing has gone as smoothly as possible, allowing for *Columbia* to be moved this week from its hangar in Orbiter Processing Facility to the Vehicle Assembly Bldg. for mating to its external tank and solid rocket boosters. Rollout to the launch pad atop the Mobile Launch Platform and crawler is scheduled for Wednesday, June 11.

Prior to rollout, inspections of *Columbia*'s forward reaction control system revealed cracks in several thermal protective tiles

which will require replacement. Work to replace those tiles will be performed at the pad and should have no effect on the launch schedule.

Additional wiring work in *Columbia*'s cargo bay caused the Spacelab transfer tunnel installation to slip a day, but technicians made up the time and kept *Columbia* on its roll out schedule. Some of the wiring work will be carried to the launch pad, and is not expected to affect the final weeks of the launch flow.

If STS-94 launches on July 1, *Columbia*'s processing flow would be the shortest since

return to flight by four days eclipsing the 86-day flow of the orbiter between the STS-58 and STS-62 missions in late 1993 and early 1994.

The reflight of MSL-1 also will mark the fastest turnaround for a crew. Commander Jim Halsell, Pilot Susan Still, Mission Specialists Janice Voss, Mike Gernhardt and Don Thomas, and Payload Specialists Roger Crouch and Greg Linteris will break the 128 day flight-to-flight record of Steve Nagel, set on STS-51G and STS-61A in 1985.

If *Columbia* launches on time, landing would occur 16 days later on July 17 just after sunrise. The actual planned mission duration is 15 days, 16 hours, 46 minutes.



COLUMBIA

Community News

'Solar 500' in Seabrook

Sun-powered model car race allows JSC engineers to shine

For the second year in a row, fifth-grade students at Ed White Elementary School capped off a week of work designing and building solar-powered model cars with a race of their vehicles in the school parking lot.

The race, which is 500 inches long, was dubbed the "Solar 500" by Cindy Cross of Engineering's Crew and Thermal Systems Division. Cross is from Indiana, the home of the Indianapolis 500.

"This year it was great. We had beautiful sun and the cars ran very well," said Cross, who complained about missing the real Indy 500 because of this year's rain delays. "We ran two at a time on fishing lines to guide them because they have no steering."

Twenty-four cars competed in the May 13 race, with eight teams from each of three different classes participating. Each class raced each other, then the three winners vied head-to-head for the overall championship, she said.

"You hear them all cheering for one another and when you have a real close race it gets to be pretty exciting," Cross added, confiding that "I think the engineers have more fun than the kids do because we're not graded on anything."

Volunteering with Cross were JSC engineers Scott Askew, of Engineering's Automation, Robotics and Simulation Division; John Cornwell, Mike Ewert, Mike Rouen and Larissa Smit, all of Engineering's Crew and Thermal Systems Division; and Hamilton Standard engineer Dave Oswald.

The innovative educational pro-

ject, called "Solar Power-Up," was cosponsored by the Texas Solar Energy Society and the JSC Education Outreach team. The Solar Energy Society provided solar photovoltaic panels, motors, gears and other parts for the cars, while JSC provided volunteers who helped the students learn about teamwork, aerodynamics, friction, solar power and other engineering lessons. Parents, teachers and students all praised JSC's involvement in the project, Ewert said.

The curriculum is designed to teach the students to work in design teams, make group decisions about the engineering problems they encounter, build the model and present details of what they learned to fellow students, teachers and parents.

Cross said that as they made their presentations, the students mentioned things they had learned about aerodynamics, gear ratios, friction, weight and other scientific and engineering principles.

"They do pick up on a lot of things, and as a team they learn to work together," Cross added.

This year, several of the top teams from Ed White Elementary were able to participate in a regional competition in San Antonio, where they won the top three places.

Just as the use of solar panels has spread in recent years to such visible applications as calculators and crosswalks, organizers hope these solar races spread to other schools as a way of introducing more students to solar power technology and other engineering princi-



JSC Photos 97-06612 and 97-06613
by Steve Candler

JSC engineers and Ed White Elementary School students work together to power model cars with sunlight in a recent "Solar 500" race in the Seabrook school's parking lot. Above: Standing, from left, Cindy Cross, Dave Oswald and Mike Ewert watch as the students get ready at the starting line. The students used fishing-line guides to steer the cars down the 500-inch track. Left: Ewert helps a student prepare her car for the race. Several of the top teams from Ed White went on to the regional competition in San Antonio, where they won the top three places.

Science museum offers summer camps around town

During the summer, the Houston Museum of Natural Science will offer Exploration Camps, designed to give insight into the world of science, for students ages 4-14.

Using museum collections and facilities, students have the opportunity to explore science topics in an interactive and exciting way. Touchable artifacts, creative crafts and fun activities are an integral

part of these camps.

Week-long camps which better accommodate parents' schedules are offered Monday-Friday in two-hour formats for ages four and five and in five-hour formats for ages 6-12. Summer camps begin June 2 and run through Aug. 8.

Some of the classes that are offered include:

Dynamic Dinosaurs (age four),

Digging Dinos (age five) and Reptiles Rule (ages six and seven) allows children to build models, examine fossils and create art projects.

Magic and Movie Making for children ages eight and nine focuses on learning how moving pictures work. Participants will make a movie of their own to take home.

At the museum's Challenger

Learning Center and the George Observatory in Brazos Bend State Park, kids become part of the crew of a simulated spacecraft. An overnight mission is offered at the George Observatory on July 18-19. After training, the crew will enter the spacecraft for an 11 p.m. liftoff. Crew members will spend the night in the spacecraft and complete the mission after an early morning wake up call.

From Planet Painting to an Astrosafari, summer classes held in the natural setting of Brazos Bend State Park, provide an enriching experience for young people.

For camp availability and registration information, visit the museum home page at: <http://www.hmns.mus.tx.us/hmns/home.html> or call the education department at 639-4652.

Employees may exhibit works

Employees are encouraged to exhibit their talents during JSC's annual American Heritage Week.

American Heritage Week, planned for the week of July 7, will highlight and celebrate the diversity of the workforce at JSC.

"This is an opportunity for us all to learn more about each other and the wealth of diversity represented at JSC," said Jessie Hendrick, exhibit coordinator. "Employees interested in displaying their skills can do so during this week-long celebration."

Hendrick said the exhibits/displays may include art work (painting, sculpting, modeling); needlework

(quilting, embroidering, needlepoint, dress making); collections (antiques, collectibles, items of interest); and hobbies (crafting, woodworking).

Both civil service and contractor employees are welcome to participate. Entertainment and exhibits will be presented during the week at the Bldg. 3 cafeteria during lunch with the grand finale being held at 3 p.m. Monday, July 14, at the Gilruth Center. As in past years, the grand finale will be an evening of cultural entertainment, exhibits and food at no charge to attendees. Interested exhibitors should contact Hendrick at x31203.

Gilruth basketball season ends

Men's basketball recently ended its spring season with four teams making the playoffs from a field of nine teams.

The Grey Panthers, Team Bud, Cardinals and Bulls all made the playoffs. In the first round the Grey Panthers were matched against the Bulls and Team Bud against the Cardinals. The Bulls defeated the Grey Panthers, 57 to 45 which advanced them into the champi-

onship game. In the second game, Team Bud defeated the Cardinals 49 to 41, advancing them to the championship game.

In the championship game, Team Bud defeated the Bulls 48 to 46. Managers for the teams are Team Bud, Philip Reid; Bulls, Dennis O'Conner; Grey Panthers, Larry Ratcliff; and Cardinals, Don Molgaard.

Registration is now under way for the spring season.

JSC Safety Alert

Paper Shredder Risks

What Happened

An employee was picking up paper from the floor near a paper shredder that had been placed on the floor in a highly trafficked pathway. The corner of her suit jacket accidentally entered the insert slot of the shredder, the shredder automatically started, and a portion of her jacket was pulled into the machine and shredded.

Outcome of the Investigation

The shredder was identified as a Security Engineered Machinery Model 233. In this model, paper must be inserted vertically into a narrow, 10-inch wide slot. At the slot, there is a photocell that automatically turns the unit on, and the shredding action pulls the inserted material into the shredder.

The unit involved is 22 1/2 inches high, and due to its low height, one must bend forward to insert paper. In doing so, personal material can accidentally enter the slot vertically, contact the photocell, and activate the shredder. This material can include your badge, necktie, jacket bottom, scarf and hair.

All of the SEM 233 vertical feed shredders at JSC are now unplugged and tagged with a "DO NOT OPERATE" tag until an appropriate shield can be provided and installed on the units. The shield will eliminate accidental entry into the vertical feed shredder slot.

What You can Do

When operating a paper shredder where there is the risk of an accidental entry of body parts or clothing:

- Be cautious of loose clothing, badges, bracelets, ties and hair.
- Observe all warning labels on the machine.
- Do not locate the machine in a highly trafficked path or area, if possible.
- Raise the machine to eliminate bending over it, if possible.
- Employees with a vertical feed shredder should call the Occupational Safety Office at x31347 for an evaluation.

Interview with Lee Norbraten, director ISO 9000 Office

The JSC Quality System is now in operation and JSC Management would like all employees to be familiar with and understand what the Quality System and ISO 9000 are all about. Lee Norbraten, director of the ISO 9000 Office, answers some questions about the JSC Quality System:

Q: What is ISO 9000?

A: The International Standards Organization uses the ISO 9000 set of requirements to define how organizations promote higher quality in their products and services.

More academically, ISO 9000 is standards and guidelines that define an effective quality system. An organization becomes registered after it proves to an external (third party) auditor that its management systems adhere to the requirements of ISO 9000.

Q: What is the difference between ISO 9000 and ISO 9001?

A: The International Standards Organization has many different series of standards which refer to different activities such as environmental systems (ISO 14000) or film speed (ISO 400). ISO 9000 is the series that refers to quality systems. ISO 9001 is the most detailed, comprehensive set of standards in the ISO 9000 series. JSC has always demanded world class leadership in the effective management of its programs and in the quality of the work it performs, providing value and inspiration to its constituents. The NASA administrator and the JSC director, recognizing the significance of the ISO 9001 standard, and wishing to maintain NASA's leadership role in quality, have required JSC to seek and obtain ISO 9001 registration.

Q: Does ISO 9000 represent a higher standard?

A: Previous NASA quality systems were based on the NASA Hand Book 5300 standard. ISO 9000 represents an improvement in that standard for several reasons. First, it makes quality the responsibility of the overall management and not just the quality department. Second, ISO 9000 establishes requirements only, leaving it up to the organization to establish procedures that best fit its operation. In other words, it describes the "what", but not the "how to." Third, ISO 9000 addresses total system quality and not just the goodness of the end product. Finally, ISO 9000 implementation at JSC will require an external certification process as proof that the standard has been met.

Q: What is the center's mandate with respect to ISO?

A: The Administrator has determined that, "All NASA centers are to be third party registered to ISO 9001."

The center director has established November 1997 as the target date for the center to be registered under ISO 9001. JSC Director George Abbey has stated that JSC needs to be more effective with an ever decreasing budget. He sees ISO 9001 as being an agent to improve the center's effectiveness.

Q: Why is the implementation schedule so aggressive?

A: The experience of industry indicates that the implementation of an ISO quality system from scratch takes at least one year. JSC's one-year implementation target assumes that most of our work processes and documentation already are in reasonable compliance with ISO requirements. In addition, strawman center-level ISO procedures already were in

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
 2101 NASA Road 1
 Houston, Texas 77058-3696



May 23, 1997

Reply to Attn of: AA/Director

QUALITY SYSTEM DECLARATION

Dear Fellow Employees:

The JSC Quality System is now in operation.

Our Quality System is based on the ISO 9001 standard for quality systems, and is documented in our Quality Manual and in 29 System Level Procedures. These documents all have been formally approved, and are available to all JSC employees on the ISO 9000 Homepage. By declaring the Quality System in operation, we are obligating ourselves to comply with these documents in carrying out our day-to-day functions. We intend to verify our compliance by means of a third party audit, currently planned for November of this year. NASA is the first federal agency to require ISO 9001 registration, and JSC is scheduled to be the first NASA field center to be registered.

I strongly endorse the management principles contained in the ISO 9001 standard. They embody the discipline that is essential for human space flight operations. Effective implementation of these principles will allow JSC to deliver more consistent quality for less cost in the products and services that we provide. This is a responsibility and a challenge that each of us must embrace.

Address all questions to your supervisor, your directorate or office ISO representative, or the ISO 9000 Office.

George W. S. Abbey
 George W. S. Abbey

place following the Safety, Reliability and Quality Assurance and Engineering pilot project. Finally, it was felt that the more aggressive schedule would ensure strong and consistent attention to the details of ISO implementation.

Q: What benefits will JSC gain from certification?

Many companies seek ISO registration for economic reasons, customers demands, or a need for more disciplined internal processes. JSC also expects economic benefits through more effective use of the resources that are entrusted to us. Some of the benefits include:

- *Prevention of nonconformances*—measured by trends in the number of procedural discrepancies reported.
- *Early definition and stabilization of requirements*—measured by trends in the number of change requests submitted.
- *Uniformity in work processes*—measured by the reduction of documents representing similar work.
- *Improved risk assessment*—measured by trends in defined risk to programs.
- *Accountability*—measured by the improvement in the cumulative cost impact of individual nonconformances.

- *Customer involvement*—measured by customer satisfaction surveys.
- *Discipline*—measured by the level of compliance to established procedures and documentation.

Q: What is the scope of certification?

A: Because the ISO 9000 quality requirements expect an organization to apply common principles and procedures throughout, all JSC activities are expected to comply with the ISO standards. However, to achieve third party registration, the external review will focus only on products and services required for the core functions of human space flight: spacecraft engineering and design, flight crew training, space and life sciences research, program and project management, and mission operations.

Q: What will be different under ISO 9000?

A: Although most of our way of doing business will remain unchanged, there are a few areas where the ISO requirements are likely to effect change. There will be a single quality system for the center, and employees will be required to know how their work fits into the quality system. How we do our work will be documented, and safeguards will be put in place to ensure that we follow the current documents. More emphasis will be placed on assuring that only certified personnel can

perform critical work. Internal audits will be conducted to evaluate whether our systems comply with the ISO requirements. More emphasis will be placed on corrective action when problems occur. In general, ISO 9000 will require our management processes and the conduct of our work to be more disciplined, more focused and better documented.

Q: Under ISO 9000, who is the customer?

A: For the purposes of ISO 9001 registration, the "customer" must be external to the organization that is being certified. In the case of JSC, the primary external customer interface is with the NASA headquarters enterprises, particularly the Human Exploration and Development of Space enterprise associate administrator. Secondary external customers would include representatives of scientific and educational communities, industrial enterprises, and international partnerships that directly receive and utilize our products and services.

Virtually all work performed at JSC also involves relationships and agreements among organizations within the center. These "internal customer" relationships establish how work gets done at JSC, and are addressed by the various System Level Procedures and Common Work Instructions which are a part of the overall quality system. The ability to satisfy the needs of these "internal customers" will be a major factor in assessing the overall quality.

Q: Are contractors part of certification?

A: JSC is certifying the core business of the center. To the extent that contractor employees are accomplishing the core business objectives under direct civil service leadership, or are using JSC-defined procedures, they are within the scope of the JSC certification. Other work activities are outside the scope of JSC certification. However, there may be a requirement in the contract that such a vendor be independently ISO 9000 certified.

Q: What about work performed at other centers?

A: The scope of the Space Shuttle Program, the International Space Station Program, the Space Operations Directorate, and other JSC programs and projects extends to other NASA centers. This work will be considered outside the scope of the JSC registration. However, individual JSC programs and projects may establish agreements with other centers relative to ISO 9000.

Q: What advice do you have for successfully achieving ISO 9000 implementation?

A: We have to promote the reality that all the personnel involved become active advocates of ISO 9000 and not just participants in the process. ISO 9000 requires more than just going through the motions to get registered. On the surface it involves writing down the procedures for accomplishing our work and agreeing to perform our work according to those procedures. From a broader perspective, it provides the tools to find and use commonalities in similar procedures and a method of improving work procedures in a controlled manner.

Q: What other cultural changes can we expect?

A: One cultural change will be the development and use of a Corrective Action System that does more than track problems and their resolution. ISO 9000 promotes a focus on problem prevention over "fire fighting." The key to the Corrective Action System will be to identify the root cause of problems to prevent recurrence.

ISO 9001 Elements

- 4.1 Management Responsibility
- 4.2 Quality System
- 4.3 Customer Agreement
- 4.4 Design Control
- 4.5 Document and Data Control
- 4.6 Purchasing
- 4.7 Control of Customer Supplied Product
- 4.8 Product Identification and Traceability
- 4.9 Process Control
- 4.10 Inspection and Testing
- 4.11 Control of Inspection, Measuring, and Test Equipment
- 4.12 Inspection and Test Status
- 4.13 Control of Nonconforming Product
- 4.14 Corrective and Preventive Action
- 4.15 Handling, Storage, Packaging, Preservation, and Delivery
- 4.16 Control of Quality Records
- 4.17 Internal Quality Audits
- 4.18 Training
- 4.19 Servicing
- 4.20 Statistical Techniques

Quality System Personal Checklist

Know the answers to these questions:

1. What is the JSC Quality Policy?
2. What does this policy mean to you?
3. How do you implement this policy in your job?
4. What is the hierarchy of the JSC document system?
5. What procedures/work instructions do you use to do your job?
6. How do you know that you are using the correct version?
7. Who is your document custodian?
8. Where can you find a copy of the JSC Quality Manual?
9. Have you removed uncontrolled procedures and work instructions from the shelves, walls, computers, machines, etc.?
10. Do you know the qualification requirements to perform your job?
11. Do you know where your training records are kept?
12. Are all training certifications up to date?

If you do not know the answers, see your directorate ISO 9000 representative.

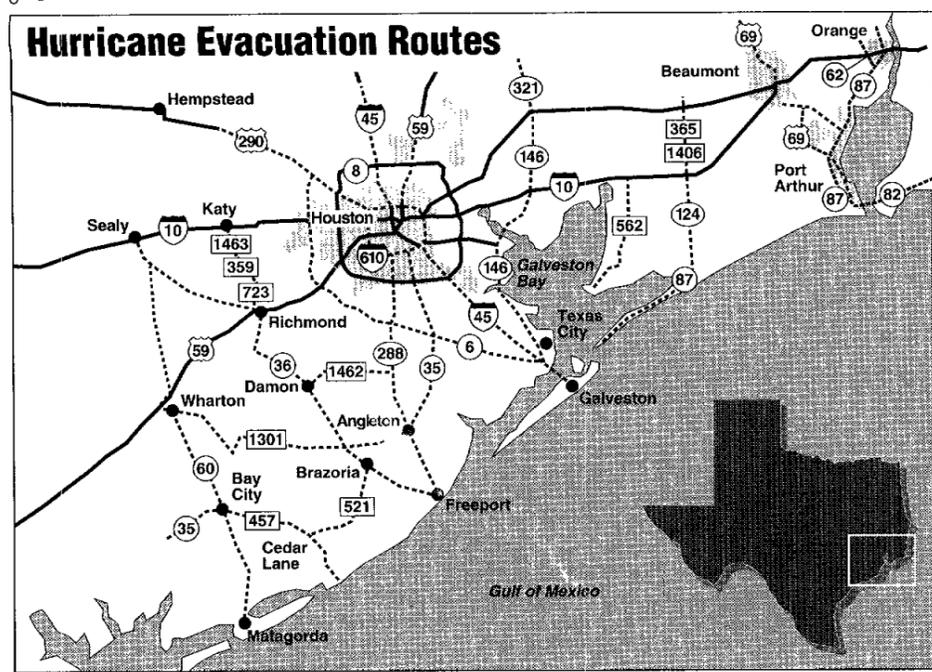
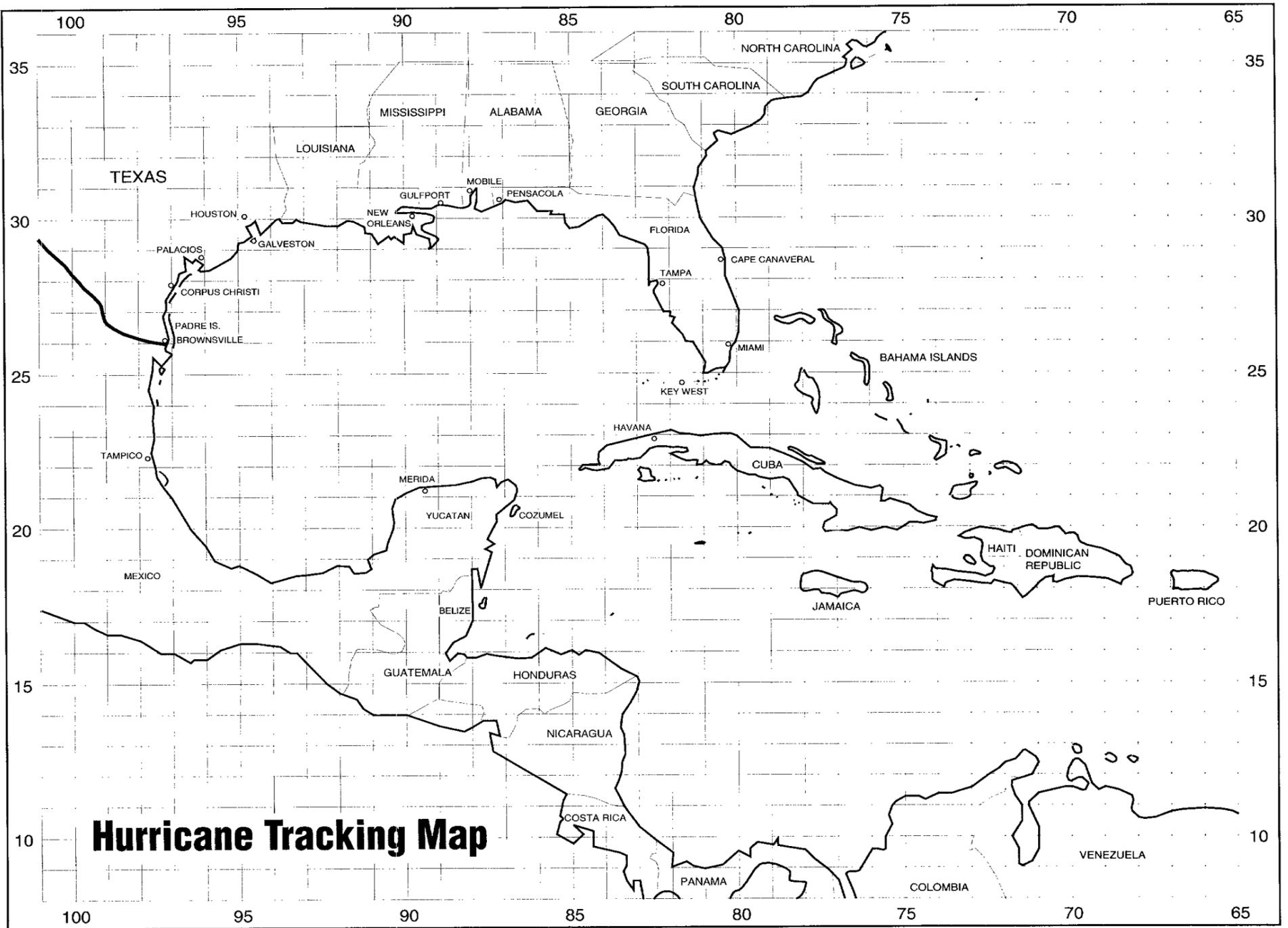
Directorate Representatives

AH	Glen Van Zandt.....	483-3069
AI	Jean E. Carter.....	483-7556
BA	R. Gene Easley.....	483-4077
CA	Larry A. Bowden.....	244-9103
DA	Gary M. Kane.....	244-5192
EA	Lewis O. Casey.....	483-2015
GA	William A. Larsen.....	483-4062
JA	Vincent L. Johnson.....	483-7986
MA	Carl B. Shelley.....	483-4095
NA	Larry C. Shaw.....	483-2173
OA	Bruce Luna.....	244-8972
SA	J. Britton Walters.....	483-7334
TA	William L. Davidson.....	483-7702
XA	Charles D. Mendel.....	483-1286
YA	Lydia L. Gavin.....	483-8007

Other key ISO phone numbers

Audit Manager	Nick Lance.....	483-3677
Implementation	Brent Fontenot.....	483-6456
Assessment	Al Conde.....	483-3644
Chief of Staff	Leon Blum.....	483-3681

Also, visit the JSC ISO Homepage
<http://www4.jsc.nasa.gov/ISO9000>



CLIP AND SAVE—Employees can keep this handy reference in their daily planners by cutting the page on the dotted line, placing holes on the left side of the pages and folding once. By keeping these references close at hand, employees should be able to minimize the effects of a storm to their offices and personal property.

Emergency Supply Kit

- Flashlight
- Tissues
- Radio
- Pocket knife
- Sanitary Supplies
 - Toothbrush
 - Soap
 - Shampoo
 - Sponge
 - Cleanser
 - Bleach
- Batteries
- Pencils
- Drinks/Juices
- Nuts
- Rice – Pastas
- Soups
- Canned Foods
- Water
(1 gal per person per day)



30-gallon trash barrel

- First Aid Kit
- Medicines
- Rubbing Alcohol
- First Aid Handbook
- Towels
- Blankets
- Paper Towels
- Toilet Paper
- Candles
- Matches
- Can Opener
- Peanut Butter
- Crackers
- Dried Beans
- Change of Clothing
- Foul Weather Gear
- Sterno, Stove, Fuel
- Garbage Bags
- Cooking Utensils
 - Cooking Pot
 - Plastic Dishes
 - Silverware
 - Aluminum Foil

Emergency Numbers

JSC Emergency Information Line	x33351	Galveston (city)	409-766-2102
JSC Employee Information Line	x36765	Galveston County (north)	281-534-2531
Emergency	9-1-1	Galveston County (south)	409-762-8621
Harris County Flood Control (river levels)	713-881-3100	Harris County	713-881-3100
National Weather Service	281-337-7895	Hitchcock	409-986-5559
Texas Highway Department (road closures)	1-800-452-9292	Houston (city)	713-881-3045
Emergency Management Offices		Kemah	281-334-5414
American Red Cross	282-6000	LaMarque	409-938-9269
Galveston County	409-945-7200	League City	281-332-0440
Harris County	713-526-0636	Nassau Bay	281-333-4200
Clear Lake Office	281-282-6039	Pasadena	281-475-5588
Baytown	1-281-420-6556	Santa Fe	409-925-2000
Clear Lake Shores	281-334-1034	Seabrook	281-291-5610
Deer Park	281-478-7298	Taylor Lake Village	281-326-2843
Dickinson	281-337-2489 x240	Texas City	409-643-5707
El Lago	281-326-1951	Webster	281-332-1826
Friendswood	281-996-3335		

Hurricane Preparation To Do List

Before leaving the office:

- ✓ Unplug computers and wrap in plastic bags.
- ✓ Unplug all electrical equipment.
- ✓ Close all doors.
- ✓ Move unique or valuable papers to inside rooms.
- ✓ Secure all classified material, lock all security files, safes and cabinets.
- ✓ Remove bottom file drawers and place on a desk or table, if file cabinets are located on the first floor.
- ✓ Raise venetian blinds to near the top of the window without jamming.

Things to do at home:

- ✓ Check your portable radio and battery-operated lights and flashlights.
- ✓ Monitor weather broadcasts for current conditions and advisories from local emergency management officials.
- ✓ Rotate food supplies every six months.
- ✓ If evacuating, be sure to post a prominent note with evacuation details.
- ✓ Provide for pets, especially if evacuating.

NOTE: This list is not intended to be all-inclusive. Employees must decide what supplies are best suited for their family's survival. This list contains only suggestions for consideration.

Spaceflight Meteorology Group's Frank Brody answers questions about hurricanes

How is a hurricane formed?

Hurricanes originate as a cluster of showers and thunderstorms in tropical waters. Three major factors are required for hurricane formation—warm ocean water, favorable low level winds and light upper level winds.

A hurricane's main sources of energy are heat and moisture. Developing hurricanes gather these sources through contact with warm ocean waters. Typically, water temperatures of 80 degrees Fahrenheit or warmer are needed storm development.

Wind patterns are critical for tropical storm formation. The pattern most conducive to tropical storm formation is when low level winds, below 5,000 feet, are converging, and upper level winds, above 25,000 feet, are light and diverging. Upper level winds that are too strong will greatly inhibit tropical storm development, and often cause a hurricane or tropical storm to weaken.

What are the different parts of the hurricane?

The typical hurricane has two or three and sometimes more outer convective bands, also called "feeder bands." These bands are comprised of cells resembling ordinary thunderstorms and can be up to 300 miles from the eye. The outer convective bands are generally 40 to 80 miles apart and come in advance of the main rain shield.

The rain shield is a solid area of rain that typically becomes heavier closer to the eye. The outer edge is well defined and its distance from the eye varies greatly from storm to storm.

Spiral bands or convective rings are regions of active showers and thunderstorms that encircle the centers of hurricanes. They are especially prevalent in the more intense hurricanes and curve cyclonically inward toward the center of the storm where they appear to merge to form the eye wall.

The eye wall is an organized band of thunderstorms that immediately surrounds the center or eye of a hurricane. It's generally around 15 miles wide and typically contains the fiercest winds and most intense rainfall.

The eye is a relatively calm center of the hurricane. The winds are light, and skies may be partly cloudy or even clear. The average hurricane eye diameter is a little more than 20 miles.

In general, when the eye is shrinking in size, the hurricane is intensifying. After the eye's passage, the violent wind blows in the opposite direction to what it was right before the eye moved over an area and the heavy rain returns.

What is a storm surge?

A storm surge is a large dome of water often 50 to 100 miles wide that sweeps across the coastline near where a hurricane makes landfall. Storm surge can range from four to six feet for a minimal hurricane to greater than 20 feet for the stronger ones. The stronger the hurricane and the shallower the offshore water, the higher the surge will be. This can cause severe flooding in coastal areas, especially when the storm surge coincides with normal high tides. Water weighs about 1,700 pounds per cubic yard; extended pounding by frequent waves can demolish any structures not specifically designed to withstand such forces. Along the immediate coast, storm surge is the greater threat to life and property, even more so than the high winds.

More than 8,000 people were killed in the Galveston hurricane of 1900, most by storm surge. Hurricane Camille produced a 25-foot storm surge in Mississippi. Hurricane Hugo in 1989 generated a 20-foot storm tide in South Carolina. Hurricane Andrew in 1992 caused a 17-foot storm surge in southeast Florida.

Note, the elevation of JSC ranges from 15 to 23 feet, so a 20 foot storm surge could put the lowest elevations at JSC under five feet of water.

How much rainfall and flooding can a hurricane produce?

Hurricanes, tropical storms and tropical depressions are capable of producing abundant amounts of flood-producing rainfall. During landfall, a hurricane rainfall of six to 12 inches is common. If the storm is large and moving slowly, greater amounts of rainfall can be expected. To get a rough estimate of the potential rainfall amount (in inches), divide the storm's forward motion into 100. For example, a storm moving five miles per hour could produce 20 inches of rain.

Tropical Storm Claudette in 1979 brought 45 inches of rain to an area near Alvin, Texas, contributing to more than \$600 million in damage. Hurricane Agnes rainfall in 1972 caused disastrous floods in the eastern U.S., including 118 deaths and \$2.1 billion in property damage.

What about tornadoes?

Hurricanes also produce tornadoes, which add to the hurricane's destructive power. Typically, the more intense a hurricane is, the greater the tornado threat. When a hurricane brings its winds inland, the fast-moving air hits terrain and structures, causing increased low level wind convergence due to friction. This, in turn, enhances atmospheric lifting which increases the threat of tornadoes. The greatest concentration of tornadoes occurs in the right front quadrant of the hurricane.

What kind of damage can happen from the wind of a hurricane?

Hurricane winds are a serious force to be reckoned with. As winds increase, pressure against objects is added at a disproportionate rate. Pressure force against a wall increases with the square of wind speed; a threefold increase in windspeed gives a ninefold increase in pressure. A 25 mph wind causes about 1.6 pounds of pressure per square foot, and places 50 pounds of force on a four by eight sheet of plywood. In 75 mph winds, that force becomes 450 pounds, and in 125 mph, it becomes 1,250 pounds.

Who issues hurricane watches and warnings?

Hurricane watches, warnings and advisories are officially issued by the National Weather Service's National Hurricane Center in Coral Gables, Fla. Meteorologists at this center specialize in hurricane and tropical storm forecasting. They continually monitor atmospheric and ocean conditions, evaluate an array of atmospheric computer models and disseminate watches, warnings and advisories on all stages of tropical systems, including tropical depressions, tropical storms and hurricanes. The Houston/Galveston National Weather Service Office in League City, Texas customizes hurricane watches and warnings for southeast Texas. The Spaceflight Meteorology Group customizes watches, warnings and advisories for JSC management and emergency planning managers.

How accurate are hurricane forecasts?

The National Weather Service's National Hurricane Center in Miami, Fla., prepares the

official hurricane watches, warnings and advisories for the U. S. and adjacent ocean areas. Hurricane forecasters use their expertise about these storms, along with a suite of atmospheric numerical models, to forecast motion and intensity, leading to issuances of watches and warnings for land areas. Major advances have been made in hurricane forecast accuracy during the past 25 years due to improved satellite imagery and more sophisticated computer models. The average 72-hour forecast position error is about 300 miles, and the average 24 hour forecast position error is about 100 miles. This distance can mean the difference between destructive winds and storm surges and merely "tropical storm" conditions. Hurricane forecasting is improving but is not an exact science. Hurricane intensity changes are quite difficult to predict and the best plan is to expect the worst. A good rule of thumb is to plan for a storm arriving one category stronger and 12 hours sooner than predicted.

What is the difference between a tropical disturbance, tropical depression, tropical storm and a hurricane?

A tropical disturbance is a discrete system of organized showers and thunderstorms that originates in the tropics and maintains its identity for 24 hours or more.

A tropical depression is an organized system of clouds and thunderstorms with a defined counter-clockwise circulation with maximum sustained winds of 38 mph or less.

A tropical storm is an organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph.

A hurricane is an intense tropical weather system with a well defined circulation and maximum sustained winds of 74 mph.

A typhoon is the name given to hurricane-strength systems in the western Pacific (west of 180 degrees west longitude).

When is hurricane season?

In the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico hurricane season extends from the first day in June until the last day of November. The peak hurricane threat exists from mid-August to late October. In other parts of the world, such as the western Pacific, hurricanes can occur year-round.

Know when to evacuate; planning key to protection

One of the most effective ways to protect human life during a hurricane is to evacuate and JSC Emergency Preparedness Manager Bob Gaffney encourages employees to make a plan that includes evacuation.

Gaffney, a member of the JSC Hurricane Rideout Team, encourages employees to make plans for their personal protection well in advance of the development of a hurricane.

"Now would be a good time," he said. "Personal protection plans should anticipate the arrival of tropical storm-force winds 12 hours or more before a hurricane makes landfall, and expect more of the same on the backside of the hurricane. People who don't evacuate in advance of a severe storm could be isolated in their homes for an extended period of time before community officials are able to restore damaged utilities and re-establish normal municipal operations," Gaffney said.

Employees who live around JSC should take extra precautions due to the potential for flooding. Flooding can come in the form of a storm surge or heavy rainfall. Both are common occurrences associated with hurricanes.

Evacuation plans should include a specific destination, an evacuation route, (see map page 5), a list of items needed (medications, etc.) and plans for pet care.

"Make sure you have enough medication to last awhile in case your regular pharmacy is closed due to damage by a hurricane," Gaffney said. "If pet owners are evacuating to a hotel, you need to make sure the hotel will take pets," he added.

The evacuation route may become the most important element of an employees' plan. To find the best possible route employees can contact their local emergency management offices (see chart on page 5). Gaffney said it's also a good idea to have a backup route planned in case of traffic congestion or flooding. The local emergency management office also can inform employees about whether their home would be affected by storm surge and high tides.

"A lot of people forget that getting to Houston isn't a problem during initial stages

of evacuation," Gaffney said. "It's the fact that beyond Houston, all escape routes are reduced to two-lane roads that can quickly become jammed despite the best efforts of traffic managers, Metro and the Texas Department of Public Safety. People have the best chance of influencing a successful evacuation if they'll make a family emergency plan ahead of time, which includes an early evacuation decision, and stick to the plan."

"Employees should assess the vulnerabilities of their home and contents and develop firm plans for transportation and shelter for their families," Gaffney said. "Neither the American Red Cross nor local communities open shelters in advance of hurricane threats because Clear Lake is in a flood plain and people could get trapped in shelters when local flooding is severe."

Hurricanes are very unpredictable, Gaffney said, and employees need to know when to activate their emergency plan. An example of how hurricanes can change without notice is Hurricane Opal in 1995. The storm was moving slowly and steadily toward Texas. It made a dramatic turn toward Florida and eventually picked up speed and increased in strength. Residents were not prepared and a last-minute evacuation turned into chaos.

The hurricane is not the only problem that can arise during the storm season. During the storm, heavy rains, tornadoes and flooding also must be considered. When making evacuation plans include alternate routes in case roads are impassable.

Gaffney said a good rule of thumb is that if a storm is in the Gulf, begin making preparations. The National Weather Service suggests planning on the hurricane being one category stronger than forecast and arriving 12 hours sooner.

"Be prepared," Gaffney said. "Knowing what to do in an emergency, such as when a hurricane threatens, is the best possible protection you and your family can have. Check your supply list today and make sure you have everything that you will need. If you plan ahead—carefully and thoroughly—you can greatly reduce the chances of personal injury and property damage."

JSC prepares buildings, staff to enter storm season

Spring brings one of the more pleasant seasons here on the Gulf Coast, but it also means that hurricane season is once again here.

June 1 marks the time the JSC Hurricane Rideout Team once again will keep a close eye on what is happening in the tropical waters of the Atlantic and Gulf. JSC's Bill Roeh, chief of the Plant Engineering Division and captain of the Hurricane Rideout Team, has primary responsibility for preparing JSC when a severe storm threatens the center. He coordinates the work of area protection teams and the emergency planning representatives in every organization, and ensures that emergency supplies are ready through the Support Operations Division.

Roeh prepares the center according to preparation levels listed in the Hurricane and Severe Weather Plan.

At Action Level 4, which becomes effective when a hurricane enters the Gulf of Mexico or is within 72 hours of making landfall, the center begins to prepare. Hurricane team members review the plan once more to assure all support organizations know their part. Weather forecasters in the Spaceflight Meteorology Group provide real-time interpretations of bulletins from the National Hurricane Center and advise the Hurricane Rideout Team and JSC senior managers throughout the storm period. Recall rosters for the Hurricane Rideout Team are verified and the list of organization and contractor emergency planning representatives is checked to ensure everyone can be notified of a change in the center's preparedness status.

Action Level 3 goes into effect if a hurricane could threaten the Clear Lake area. At the discretion of Center Operations Director Jim Hickmon, the Rideout Team relocates to the Emergency Operations Center in Bldg. 30, Rm. 3100.

Once the likelihood of a hurricane striking the Houston-Galveston area grows great enough, JSC Director George Abbey will decide whether to release employees and close the center, which usually moves the center into Action Level 2. Information concerning work assignments and closing JSC will be delivered to employees through their organization's emergency planning

representatives.

"An important part of preparing the center for closing because of a hurricane threat is securing offices, a responsibility that falls on every employee," said Keith McQuary JSC's Hurricane plan manager. "Each employee should secure his or her individual work area (see to do list page 5)."

JSC's grounds and facilities are prepared for a storm by a group of 14 Area Protection Teams from the Plant Engineering Division. They check buildings and roofs, pick up loose objects and materials outside and secure potential windblown hazards.

"The main thrust should be on preparation; those things that all employees can do to mitigate the effects of a storm or minimize the degree of damage it can do," McQuary said. "Preparation is the key to successful recovery; we'll recover, but our recovery will be faster if we prepare adequately in advance."

Although emergency preparedness workers are responsible for taking care of JSC first, McQuary said, the center can help the surrounding communities on a case-by-case basis. Sharing the Emergency Operations Center as well as the center's plans, will help community leaders know what kind of help may be available from JSC.

Level 1 starts when gale-force winds arrive at the center, making it unsafe to continue outside activities. Prior to Level 1, Roeh gathers the Rideout Team members at their posts and waits for the storm to subside. Activities during the storm are limited to essential emergency repairs that can be performed without compromising life safety or endangering personnel.

The Rideout Team goes back into action once the storm passes, assessing the damage and arranging the necessary repairs. In the event of a center closing, employees can continue to stay in contact through the use of two recorded phone services (see phone list page 5).

The Center Director is kept informed of the center's recovery status by the Center Operations Director. Public Affairs notifies employees when to return to work through the information services and return-to-work notifications broadcast by local radio and television stations.



JSC Photo S84e5033

↑ In Mir's base block, members of the STS-84 and Mir-23 crews, who trained together both in Russia and the U.S., reunite in Earth orbit. In the back, from the left, are Mir 23 Flight Engineer Mike Foale, STS-84 Mission Specialist Edward Lu, STS-84 Pilot Eileen Collins and Mission Specialist Carlos Noriega. In front are STS-84 Mission Specialists Jean-François Clervoy and Jerry Linenger and Mir 23 Commander Vasili Tsibliyev. Not pictured are STS-84 Commander Charlie Precourt and Mir 23 Flight Engineer Alexander Lazutkin.



← *Atlantis* Commander Charlie Precourt greets Mir 23 Commander Vasili Tsibliyev shortly after the docking of *Atlantis* and Mir in Earth orbit. STS-84 is the sixth shuttle docking to the Russian Mir Space Station continuing America's presence in low-Earth orbit. Linenger is the fourth astronaut to be stationed on Mir, the first was Norm Thagard, followed by Shannon Lucid, followed by John Blaha. STS-84 marked the beginning of Mike Foale's four-month stay on Mir. He will return to Earth in September when Wendy Lawrence will replace him.

JSC Photo 84e5020

STS-84 Mir mission memories



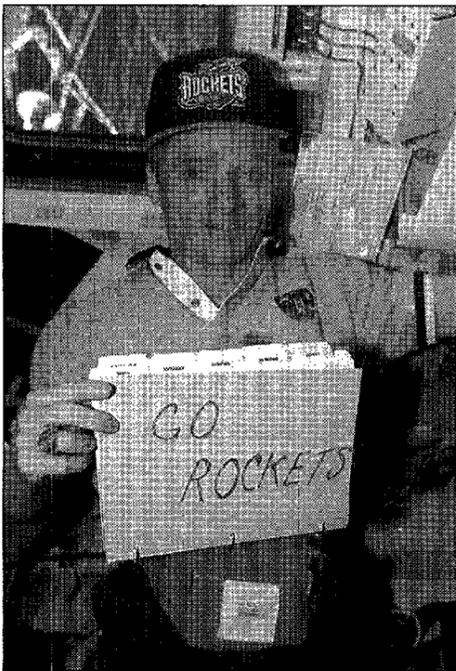
← Now wearing the onboard garment of a Mir crew member, Mike Foale, left, teams up with astronaut Jerry Linenger in the Spacehab module to master chores dealing with transfer of more than two tons of supplies from *Atlantis* onto Russia's Space Station Mir. Linenger changed from a Russian flight suit into that of the STS-84 crew when Foale became a member of the Mir 23 crew.

JSC Photo S84e5172



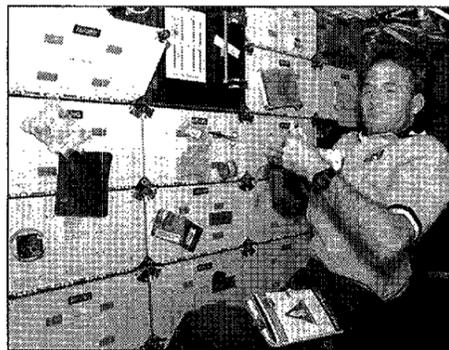
← Payload Commander Jean-François Clervoy maneuvers a large piece of hardware being transferred from one spacecraft to another in Earth orbit. Clervoy, representing the European Space Agency, is in the Spacehab module which is connected to *Atlantis* via the tunnel partially visible in the background.

JSC Photo S84e5189



JSC Photo S84e5242

↑ Precourt leaves little doubt as to whom he is supporting in the National Basketball Association conference finals as he sports a cap and displays a hand-fashioned sign in support of the Houston franchise.



Pilot Eileen Collins takes advantage of the weightless environment of Earth orbit as she juggles four film magazines onboard the Spacehab module. →

JSC Photo S84e5239

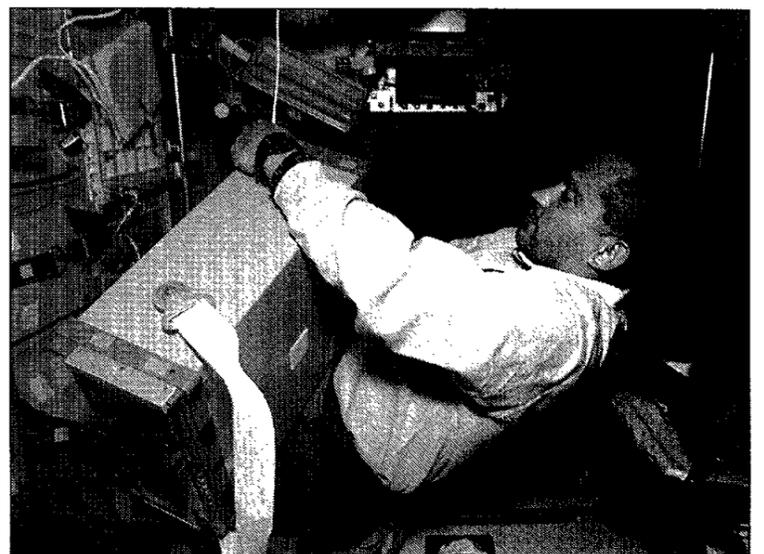
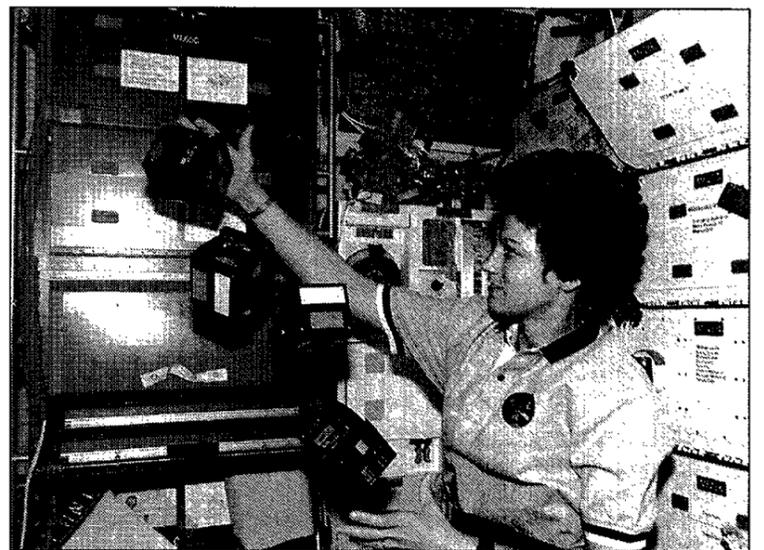
↑ Mission Specialist Jerry Linenger enjoys a snack on *Atlantis* after his four-month stay on the Russian Mir Space Station. With a Saturday landing, Linenger logged 132 days in space on this flight, the second longest single space flight by a U.S. astronaut behind the record 188-day stay in orbit by Shannon Lucid last year.

S84e5175



↑ From left, Mission Specialist Elena Kondakova checks off supplies that are transferred to the Russian Mir Space Station from *Atlantis*' Spacehab double module by STS-84 Commander Charlie Precourt and Mir 23 Commander Vasili Tsibliyev.

S84e5064



S84e5194

↑ Mission Specialist Carlos Noriega supports the supplies-transfer project between the Mir-23 crew and the *Atlantis* crew as the Mir and *Atlantis* orbited Earth in a docked configuration. He is in the Spacehab module.



32 Years Ago at MSC

Gemini IV sets world record, White performs space walk

Reprinted from the Space News Roundup June 11, 1965.

"Liftoff. We have a liftoff at 16 minutes after the hour. Climbing very nicely. We have a roll program initiated. Roll program completed, McDivitt reported, and the pitch program has been initiated."

The above description from the Mission Control Center in Houston by Paul Haney, described the beginning of what has been the United States' most spectacular and longest space flight to date, with America's first space pilot going outside a spacecraft.

Liftoff from Launch Complex 19 at Cape Kennedy was at 10:16 a.m., EST, June 3, and flight trajectory was very nearly as planned. The spacecraft with Astronauts James A. McDivitt as command pilot and Edward H. White as pilot was placed in an orbit with a perigee of 100 miles and an apogee of 175 miles.

Earlier that morning at 4:10 a.m., the Gemini IV astronauts were awakened after a night's sleep in the crew's quarters in the Manned Spaceflight Operations Bldg. on Merritt Island. They were given a brief physical and ate breakfast. The crew left for the crew's ready room at Launch Complex 16 and arrived there about 15 minutes later. There, they were suited up by about 7 a.m. and ready to board the van that would carry them to the launch pad. During this period from 5:22 a.m. until they were completely suited up, both astronauts wore an oxygen mask and were breathing pure oxygen to remove the nitrogen from their bodies. The pre-oxygenation was necessary because of the depressurization of the spacecraft for the extravehicular activities on the flight.

They arrived at Pad 19 at about 7:08 and in less than a minute were in the elevator on their way to the Gemini IV spacecraft. By 7:35, McDivitt and White were in the spacecraft and the hatches were secured.

The launch, scheduled for 9 a.m., was delayed for one hour and 16 minutes because of difficulty in lowering the launch vehicle erector tower. The count, which was near perfect, was held at 34 minutes and 59 seconds while the difficulty was cleared up.

During the first revolution of the spacecraft an attempt was made by Command Pilot McDivitt to rendezvous the Gemini IV with the booster rocket, but the maneuver was called off because excessive fuel was being used to close on the rocket.

The extravehicular activities, scheduled to

be performed during the second revolution of the Earth by Pilot White, were postponed until the third revolution. The decision to go with the "walk in space" on the third revolution was made because preparations for the activity took longer than planned.

After depressurization of the cabin, the hatch was opened and White stood up and started his egress over Hawaii. While outside the spacecraft, White was able to maneuver himself with the special maneuvering unit.

White reported "There's no difficulty in recontacting the spacecraft... I'm very thankful in having the experience to be first (in space)."

White and McDivitt held a running conversation during the entire time of the extravehicular maneuver.

Some of White's observations were, "The sun in space is not blinding but it's quite nice... I can sit here and see the whole California coast... We're looking right down on Houston... This is fun... It's the saddest moment of my life." (the latter reference was to having to return to the cabin from outside the spacecraft).

White reported that no matter what position he seemed to assume while outside the spacecraft, or what kind of whirl he went in to, he was at no time disoriented.

While at the end of the 25-foot umbilical outside the spacecraft, White took pictures with a 35mm camera and McDivitt took movies of White from inside the spacecraft.

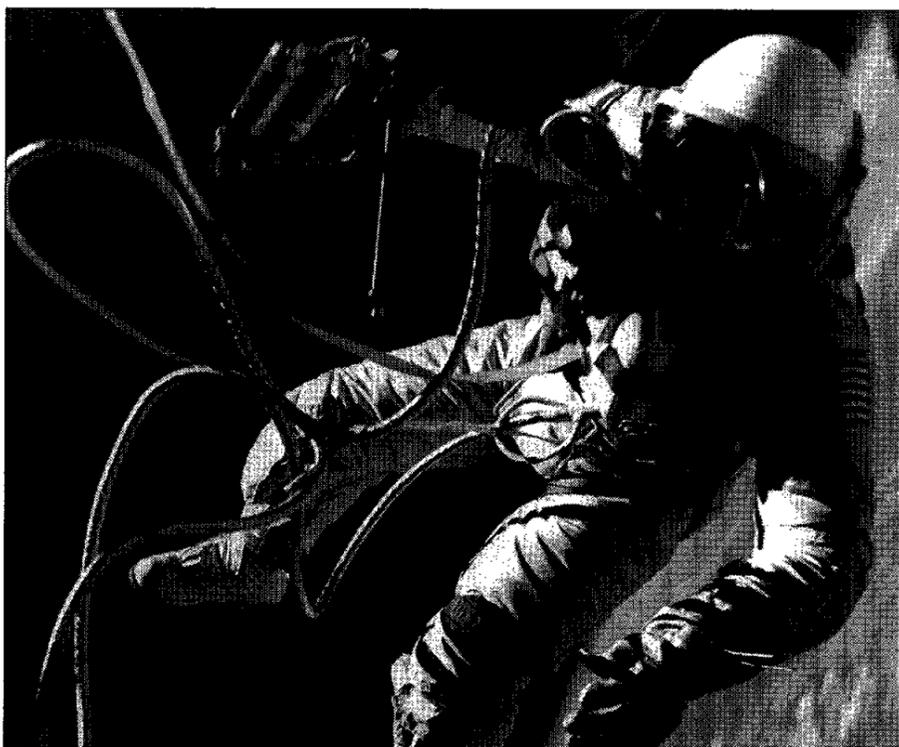
Most of the equipment used in the extravehicular activity was brought inside the spacecraft after the maneuver. The crew reported that White did discard one of his thermal protective gloves and the helmet gold overvisor.

White spent 20 minutes outside the spacecraft. Some difficulty was experienced in closing the hatch securely at the end of the maneuver but the crew was able to accomplish the closing manually.

Both astronauts talked to their wives who visited Mission Control during the flight.

Space records broken during the flight included: staying aloft longer than any multi-manned spaceship; passing the United States 22.9 orbit duration record set by Astronaut L. Gordon Cooper in 1963; and logging more time in space than the total logged by all eight previous U. S. astronauts.

During the early part of the flight, McDivitt spotted and photographed what he described as a satellite with wings and antennas on it. Attempts were made to identify the object during the mission. Another satellite was spotted later in the flight.



JSC Photos SE5-30433 and S65-22210

Top: Astronaut Ed White performs extravehicular activities while the Gemini IV spacecraft makes its third revolution around the Earth on June 3, 1965. White's gear included a specially designed space suit to protect him from heat and possible meteoroids, a gold plated visor to protect him from the sun's unfiltered rays, an emergency oxygen chest pack, a hand-held self-maneuvering unit to control his movements and a 35 mm camera to take photographs. **Above left:** Congratulations on a flight that made history and an invitation to spend the weekend at the LBJ ranch in Texas is extended to White (left) and McDivitt by President Johnson. **Above right:** Mission Director Chris Kraft monitors Gemini IV simulation before the record-setting flight.

The last portion of the flight was spent mostly in making medical evaluations on the effects of the extended space flight and checking the crew's performance and physical condition and performing various experiments. McDivitt was given the OK to complete the 20th revolution around the Earth to complete

the four-day mission. Chris Kraft, mission director, gave the OK to go the full 62 revolutions.

Touchdown of the spacecraft was just a few minutes after 11 a.m. Houston time, in the Atlantic on Monday. The prime recovery ship was the USS Wasp.

Gilruth Center News

New Hours: The Gilruth is open until 2 p.m. Saturday and closes at 9 p.m. Friday. For details, call x30304.

EAA badges: Required for use of the Gilruth Center. Employees, spouses eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Softball: Registration is under way for men's double-header softball league. Cost is \$275 per team for a six to seven week season.

NASA Fitness Challenge: runs through Aug. 31. Call x30301 for more information.

Complete Weight Control Program: starts June 24 with sessions on Monday, Wednesday and Friday. For more information call x30301 or x30302.

Hatha Yoga: A stress relieving, stretching and breathing exercise routine to unite body, mind and spirit. Classes meet from 5:30-6:30 p.m. Thursdays. Cost is \$40 for eight weeks.

Nutrition Intervention program: A six-week program to learn more about the role diet and nutrition play in health, including lectures, private consultations with a dietitian and blood analysis. Program is open to all employees, contractors and spouses. For more information call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month. Next class is June 21. Pre-registration required. Cost is \$25.

Stamp club: Meets at 7 p.m. every second and fourth Monday in Rm. 216.

Weight safety: Required courses for employees wishing to use the weight room will be offered from 8-9:30 p.m. June 12 and 26. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. Additional family members are \$50.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

Aikido: Martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. Cost is \$35 per month. New classes begin the first of each month.

Aerobics: Classes meet from 5:15-6:15 p.m. Monday, Tuesdays and Thursdays. Cost is \$32 for eight weeks.

Ballroom dancing: Beginner classes meet from 7-8:15 p.m. Thursdays. Intermediate and advanced classes meet from 8:15-9:30 p.m. Cost is \$60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health Related Fitness Program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

Gilruth Home Page: Check out all activities at the Gilruth online at: <http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

Loving Feelings Concert: 8 p.m. Sept. 9 at the Summit. Tickets are \$38.

Bus trip: June 15 to Coshatta Indian Reservation Casino. Cost is \$5.

Belize trip: June 22-27. Cost is \$999 per person for divers, \$849 per person for non-divers.

Costa Rica trip: good through June 30. Cost is \$935 per person.

Houston Astros Baseball: Field box seats \$18. Astros vs. Chicago Cubs 7 p.m. June 21. Purchase tickets by June 13. Astros vs. Cleveland Indians 7 p.m. July 2. Purchase tickets by June 23.

EAA cruises: Seven-day cruise to Caribbean leaving from Houston in November. Seven-day Alaskan cruise June 20-28. Prices vary depending on cabin choices. For more information call Dick McMiminy at x34037.

Asterworld: \$22.75. Season pass \$56.75. Multi-visit \$37.50

Waterworld: \$11.50.

Moody Gardens: Tickets are \$9.50 for 2 of 4 events.

Space Center Houston: Adult \$8.95; children (4-11) \$6.40.

Seaworld: Adult \$27.25; children(3-11)\$18.25.

Schlitterbahn: Tickets are \$20.25 for adults, \$17.50 for children.

Spashtown: Early bird tickets are \$11.50.

Movie discounts: General Cinema, \$5.25; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

JSC logo shirts: Polo style, \$23. T-shirt, \$10.

Stamps: Book of 20, \$6.40.

Orbit: The book "Orbit" by Jay Apt, Mike Helfert and Justin Wilkinson is on sale for \$28.

Metro tickets: Passes, books and single tickets available.

Lucid receives Russian Order of Friendship Medal

Astronaut Shannon Lucid received the Order of Friendship medal from Russian President Boris Yeltsin during a recent ceremony at the Kremlin honoring Russian cosmonauts and international astronauts who have flown on the Russian Mir Space Station in 1996.

The Order of Friendship medal is one of the highest Russian civilian awards and the highest award that can be presented to a non-citizen.

Lucid spent a U.S. record of 188 days in space last year. She was launched to Mir on the Space Shuttle *Atlantis*' STS-76 mission on March 22, 1996, and returned to Earth on *Atlantis*' STS-79 mission Sept. 26, 1996.

"I think the most important thing for success on a long-duration space flight... it's not the hardware, it's not your science experiments, it's the people you fly with," Lucid said after returning to Earth. "And if the people are compatible and you get along, then you'll have a great flight."

Lucid said she and her Russian crew mates were talking about the differences in their childhood perceptions of the other country.

"(We) were sitting around and talking about what it was like when we were kids, about Russia and America and how we used to have such large differences of opinion," she recalled. "They were talking about how when they were growing up—one grew up in the Ukraine and one grew up in Russia—about how they feared America. I shared with them how it was when I was growing up in Oklahoma, how Russia was the big enemy we feared so much. It dawned on all three of us at once how remarkable it was that here we were, three people who grew up in totally different parts of the world, mortally afraid of each other. Here we were sitting in an outpost in space together, working together and getting along just great. That was a remarkable revelation to the three of us. We never could have planned that."

Lucid was selected as an astronaut in 1978, the first astronaut class to include women. She has flown on five space missions, including her Mir mission, and holds pilot ratings in commercial, instrument and multi-engine aircraft.



Lucid



Mona White, who celebrated her 30th anniversary as a registered nurse at the JSC Clinic this year, prepares to give one of her renowned "painless" injections.

Mona White reflects on 30 years of JSC nursing

Ramona "Mona" White says occupational health care has changed much since she began working in the Kelsey-Seybold operated JSC Clinic 30 years ago, but there are two constants:

"You meet a lot of nice people out here," she explained. "And it doesn't get boring."

When White began her rounds at JSC in March 1967, the clinic was open all the time to support employees who were working against the clock to put humans on the Moon. "When I came here we were open 24 hours, seven days a week. We rotated shifts every week. I was used to it, it didn't bother me. I've always like the night shift."

The larger change has been in the type of care provided to the center's workers, which has migrated from treating illness to emphasizing wellness.

"Before, we didn't try to prevent anything," White says. "We took care of what you did. Now, it's up to the individual to do more to take care of themselves as far a diet and exercise. The health care system alone has changed so much. I think it is better if you learn to take care of yourself better."

White says she also remembers when nurses visited astronaut

training facilities and randomly stopped people wearing Primary Contact badges. After inquiring about their general state of health, she would then accost them with a thermometer to make certain they weren't "sick." A normal temperature meant go back to work. An elevated one meant a trip to the doctor and a pulled PC badge.

White has an "intimate knowledge of the inner workings" of many employees, including astronauts, because of her work as the primary "procto" nurse. Proctosigmoidoscopy examinations involve the use of a flexible tube with a charge-coupled device to explore the human colon in the search for disease and cancer. She even "co-starred" in a film on the subject for an astronaut Christmas party.

Her ability to give "painless" shots for allergies and travel is legendary, according to her coworkers, and many people ask for her by name. "A lot has to do with technique," she says. "I've done it so long, I do it my own way."

White is past president of the Houston chapter of the Texas State Occupational Nurses Association, and currently is director of awards, benevolence and correspondence, an elected post on the association's board.

Flight Activities team hangs STS-84 plaque

The Flight Activities Officer team earned the honor of hanging the STS-84 plaque in Mission Control following the conclusion of the successful *Atlantis-Mir* docking flight.

Lead Timeliner Mike Scheib hung the plaque on behalf of Lead Flight Activities Officer Greg Smith, and the rest of the team.

Lead Flight Director Phil Engelauf said the entire team, especially Smith and Scheib, worked long hours with little time off to deal with many late manifest changes and uncertainties during the flight, including whether there would be five or six days of docked operations and if an oxygen generation unit would be installed during or after docked operations.

Joel Montalbano, who served a dual role as Lead Russian Interface Officer and Flight Design Manager for STS-84, also earned accolades for his coordination of all preflight trajectory and performance issues.

"This was the most smoothly-executed flight I can remember, and that was due to the hard work everyone put into it preflight," Engelauf said.

BBC seeks to interview Welsh space workers

JSC employees and contractors of Welsh ancestry are being sought by the British Broadcasting Co. for an upcoming television special.

The intent of the program is to present to BBC viewers in Wales a documentary showing countrymen and their descendants who contribute to the U.S. space program.

Video interviews would be conducted on-site during the film crew's visit to JSC about Aug. 7-8. Anyone in the JSC community who is of Welsh descent and is willing to participate in the program should contact the Public Affairs Offices' John Lawrence at x38630.



Scheib



Smith

People on the Move

Human Resources reports the following personnel changes as of May 23:

Temporaries

Joan Kronenberger joins the International Space Station Program as a secretary.

Reassignments

Leslie Keener moves from the Office of the Chief Financial Officer to the Business Management Directorate as a program analyst.

Betty McNeely moves from the Office of the Associate Director to the Business Management Directorate as an administrative assistant.

William Readdy moves from the Astronaut Office to the Space Shuttle Program as an aerospace engineer.

Michael Odaka moves from the Space Shuttle Program to the International Space Station Program as an aerospace engineer.

Sharon Castle moves from the Space Shuttle Program to the Phase 1 Program as an aerospace engineer.

Promotions

Betty McNeely was promoted to administrative assistant in the Business Management Directorate.

John Russo was promoted to Program Analyst in the Business Management Directorate.

Christi Garcia was promoted to secretary (office automation) in the Mission Operations Directorate.

Michael Brieden was promoted to aerospace engineer in the Engineering Directorate.

Resignations

Alan Bachik and Tabitha Haigwood of the Mission Operations Directorate.

Retirements

Marilyn Dotson, Human Resources Office, 33 years; Richard Burghduff, Engineering Directorate, 33 years; Donald Donohoe, Engineering Directorate, 35 years.

AFGE 2284 union elects new officers

The American Federation of Government Employees Local 2284 union, which represents most JSC non-supervisory civil service employees, recently selected new officers for two-year terms.

Mary McLain of the Information Services Directorate will serve her fifth term as president.

Bridget Broussard-Guidry of the Office of the Chief Financial Officer's Financial Management Division will serve as executive vice president.

John Zieglschmid of Space and Life Sciences' Medical Sciences Division will serve as first vice president. Harvey Kelly of Engineering's

Manufacturing, Materials and Process Technology Division will be assistant vice president.

Other officers include Eric McMichael, chief steward; Linda Salinas, secretary; JoAnn Birchett, treasurer; Ledetria Beaudoin, women's coordinator; and Earnesto Romero, sergeant at arms.

Dates & Data

June 8

Space symposium: NASA and the International Academy of Astronautics will host the 12th Man in Space Symposium June 8-13 in Washington, D.C. Topics include countermeasures, biology, environmental and human factors, life support and space walking and physiology. For more information, visit the symposium's web site at: <http://cass.jsc.nasa.gov/12misf.html>

June 10

Aero club meets: The Bay Area Aero Club will meet at 7 p.m. June 10 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information call Larry Hendrickson at x32050.

June 11

MAES meets: The Society of Mexican American Engineers and

Scientists will meet at 11:30 a.m. June 11 in the Bldg. 13, Rm. 156. For details call G.D. Valle at x38835.

PSI meets: The Clear Lake/NASA Chapter of Professional Secretaries International will meet at 5:30 p.m. June 11 at the Holiday Inn, NASA Road 1. Dinner costs \$15. For details call Elaine Kemp at x30556.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon June 11 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, contact Al Jackson at x35037.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. June 11 at the Lockheed Martin, 555 Forge River Road. For more information, contact Richard Lehman at 538-1854.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will

meet at 11:30 a.m. June 11 at United Space Alliance, 600 Gemini. For details, call Pat Blackwell at 282-4302, or Ben Black at 282-4166.

Spaceland Toastmasters meet: the Spaceland Toastmasters will meet at 7 a.m. June 11 at the House of Prayer Lutheran Church. For more information, call Jeannette Kirinich at x45752.

June 12

SSQ meets: The Houston Clear Lake Chapter of the Society for Software Quality will meet at 6 p.m. June 12 at the Ramada King's Inn on NASA Road 1. David Petri, manager of the Guidance, Navigation, and Control Rapid Development Lab, will discuss "Principles of Rapid Development as Used in the Avionics Development Environment." Dinner costs \$10 for mem-

bers and \$12 for non members. For reservations or details call Renne Peterson at 335-2034.

Airplane club meets: The Radio Control Airplane Club will meet at 7:30 p.m. June 12 at Clear Lake Park Community Bldg. For more information call Bill Langdoc at x35970.

June 13

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. June 13 at the Lunar and Planetary Institute, 3600 Bay Area Blvd. For more information call Chuck Shaw at x35416.

June 18

Toastmasters meet: The Clear Lake Communicators will meet at 11:30 a.m. June 18 at the Lockheed Martin, 555 Forge River Road. For more information, contact Richard Lehman at 538-1854.

Scuba club meets: The Lunarins will meet at 7:30 p.m. June 18 at the Redfish Restaurant under the Kemah/Seabrook bridge, Seabrook side. For more information call Fred Toole at x33201.

June 19

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. June 19 in Bldg. 45 Rm. 712D. For more information on this open meeting call Gretchen Thomas at x37664.

Sept. 8

Thermal and Fluids workshop: The Engineering Directorate will host the eighth annual Thermal and Fluid Analysis Workshop from Sept. 8-13 at the University of Houston Clear Lake. For more information call Carlos Ortiz at x38879.

News Briefs

Hubble depicts Mars weather

As two NASA spacecraft speed toward a mid-year rendezvous with Mars, astronomers using the Hubble Space Telescope are providing updated planetary weather reports to help plan the missions. Hubble's new images show that the "Martian invasion" of spacecraft will experience considerably different weather conditions than seen by the last U.S. spacecraft to land on Mars 21 years ago.

Martian atmospheric conditions will affect the operation of both the Mars Pathfinder landing on July 4, and the Sept. 11 arrival of the Mars Global Surveyor which will map the planet from orbit. The images show Mars to be colder, clearer, and cloudier.

Dryden tests tailless aircraft

A NASA/McDonnell Douglas remotely piloted, tailless aircraft successfully completed its first flight on May 17 at NASA's Dryden Flight Research Center. The lack of vertical tails greatly enhances the stealthy characteristics of the airplane, and holds promise for greater agility than is currently available in existing military fighter aircraft.

Called the X-36, the subscale research aircraft lifted off from Rogers Dry Lake, flew for five minutes and reached an altitude of about 4,900 feet. An additional 24 test flights of the X-36 are scheduled at Dryden during the next six months.

Thermal protection material works well

A new thermal protection material designed to prevent spacecraft from burning up during reentry into Earth's atmosphere performed extremely well during its first flight test.

The ultra-high temperature ceramic material may someday revolutionize the approach that engineers take to the design and protection of aerospace vehicles. A large amount of data on the thermal performance of the new material was collected on May 21.

Sharp leading-edge designs for spacecraft and trans-atmospheric vehicles offer reduced drag, thereby providing substantial savings in the cost per pound expended to put objects into orbit. In addition, they provide a greatly enhanced lift-to-drag ratio, enabling what is called cross-range capability. This means that spacecraft and trans-atmospheric vehicles can reenter Earth's atmosphere from any orbit and land at any location, unlike present blunt body vehicles.

NASA technology helps put workers in good posture

By Audrey Schwartz

Poor posture or protracted activities can cause strain and fatigue for workers, including busy astronauts in the seemingly unconstrained weightless environment of space. Thanks to a new video analysis software tool developed by at JSC, working in space—and on Earth—may become much more comfortable.

The Posture Video Analysis Tool uses video from space shuttle flights to identify limiting posture and other workplace human factor problems. The software tool also provides data that recommends "appropriate" postures for certain tasks and safe duration for potentially harmful positions, such as when astronauts lying on their backs for several hours awaiting launch.

JSC recently signed an exclusive license agreement with BioMetric Systems, Houston, to further develop the technology for use by non-aerospace industries such as hospitals, physical rehabilitation facilities, insurance companies, sports medicine clinics, oil companies, manufacturers and the military.

BioMetric Systems is the first Native American company to license commercial technology with JSC. An international human factors engineering company, BioMetrics, with the assistance of the JSC Technology Transfer and Commercialization Office, plans to upgrade the posture software systems for use on both Apple Macintosh and IBM-compatible computers.

NASA needed a low-cost, reliable method of collecting data on astro-

naut postures from non-scientific mission video. The traditional "paper-and-pencil" video analysis methods required predefined views from spacecraft cameras as well as specific reference points to classify working posture. With the new video tool, researchers can use regular, nonscientific shuttle videos to gather precise information about astronaut working postures and movements.

The video tool, using an interactive menu and button-driven software, collects information on a variety of postural parameters such as body orientation, body part movement, severe or mild flexation rating, and task description. Once all the entries are made, analysis begins with a touch of a button. The tool also includes a terminology library, animation illustrating selected pos-

ture classifications, data reduction summaries and report capabilities.

The posture tool helps prepare astronauts for correctness of movement on shuttle flights. Analysis also can identify problems crews may have operating equipment to allow for hardware or procedure modifications that reduce fatigue and stress.

"The Posture Video Analysis Tool is unique because it provides a fast and simple way to collect and classify working postures, even from videos not recorded specifically for experimental analysis," said Candace Caminati, president of BioMetric Systems. "We are excited about Posture Video Analysis Tool's human factors design and analysis potential in a variety of commercial industries and plan to begin use immediately."



JSC Photo 97-06609 by Steve Candler

'SPECIAL' PROPOSAL—JSC's Mary Wiley, chief of the Mission Operations Directorate's Management Services Office, receives a surprise proposal, complete with non-alcoholic champagne, from her husband-to-be in the Bldg. 3 Cafeteria. Dave Stang, an employee of LAN, an area environmental engineering company, received a "yes" from Wiley after the May 16 proposal. The couple plans to tie the knot on Nov. 22.

JSC reaches into community with school project

(Continued from Page 1)

well as having this collaboration with the world premiere space center right at our back door."

U.S. Rep. Nick Lampson, D-Texas, joined Abbey and Wilson at the news conference announcing the project.

"I'm impressed with what the Johnson Space Center does, the people here and the businesses around JSC," Lampson said. "For this organization to be able to reach out into the community and to have a real collaboration of sharing the expertise that is a part of the federal government to facilitate the activities of the local government is a great opportunity."

Wilson said the intermediate school will be on about 35 acres at the southwest corner of JSC, west of Space Center Houston, made available to the school district under a license agreement. The school will house grades 6, 7 and 8, and will be

a replacement for what is now Space Center Intermediate School. The school may also be used as a magnet for science, math and engineering students throughout the district. A final decision on the name of the school has not been made. Construction is targeted to begin in November, and completion of the \$13 million bond-financed project is expected the fall of 1999.

Abbey said he expects JSC to work with the school to teach its students about the importance of engineering and science and what it means to them in terms of potential careers.

"Having the center in close proximity allows us to get the students out and show them our facilities, our laboratories and have them learn about what we do," Abbey said.

Wilson and Abbey agreed that the project could be a pathfinder for similar activities around the country.

"We have a vision and the vision

is a connectivity between our school system as a conduit for training and working with young people in developing their talent, but also as a prototype to show as a partnership how we can bring many entities to the table working together and have an absolute world-class type of educational experience," Wilson said. "It is a natural that this can be a prototype that can be an example to our entire nation in the area of science, math and engineering."

Abbey said numerous other cooperative educational projects sponsored by JSC and the Clear Creek district encourage young people to consider careers as the nation's future space explorers and scientists.

"If we can be successful here, I think we can set an example for other facilities around the country. I think if we're going to really make an impact on education we've got to do it all across the country," Abbey said.

Biomedical consortium joins forces

(Continued from Page 1)

space biomedical research expertise and facilities; and

- Ensure that technology development and knowledge are transferred to the private sector.

"The Biomedical Research Institute will greatly enhance the quality of our life sciences research program as we take advantage of the capability and expertise of the Baylor College of Medicine and the consortium," said JSC Director George Abbey. "The consortium also will benefit by its involvement with NASA as we make our facilities and assets available to it. And the public will benefit as space technology is made available to solve problems here on Earth."

Dr. Ralph Feigin, president of Baylor College of Medicine said, "This venture is an exciting opportunity for the worlds of space science and biomedical science to join forces. We are particularly pleased that Baylor's Dr. Bobby R. Alford will serve as chairman of the National Space Biomedical Research Institute."

"Baylor College of Medicine, the consortium institutions and the integrated research teams are more excited than ever about the extraordinary challenge and potential that this powerful partnership between NASA and academia, linked to industry, offers," said Alford, chairman of the National Space Biomedical Research Institute Board.

"We believe the opportunities are unlimited to foster and enhance the space life sciences and insure the safe long term human presence, development and exploration of space; which in turn, because of biomedical discoveries and advances in knowledge and technology, will enhance life on Earth," Alford added.

The director of the National Space Biomedical Research Institute will be Dr. Laurence Young, Apollo professor of astronautics at MIT. Young termed the institute "a major step toward further human exploration of the solar system."

Linenger: 'Good to be back on Earth'

(Continued from Page 1)

seven people, Mike Foale and his two colleagues on orbit, communicated and got along so well together that there was never any time we didn't understand what we had to do next and why."

Thick clouds prevented *Atlantis* from coming home on the first chance for landing, but the skies cleared in time one orbit later.

"It's been a very difficult mission, it's been a very successful mission on Mir," said Linenger, who joined the rest of the crew at Ellington Field. "It was a real privilege to partake in that great adventure. It's also very good to be back on Earth and feel the breeze and see you Earthlings out there."

Four of the STS-84 astronauts were making return visits to Mir—Precourt, Collins, and Mission

Specialists Foale and Elena Kondakova—but it was the first time Collins had been inside.

"I finally got the chance to go inside Mir after seeing it from the outside on 63," she said. "The Mir is just beautiful. From the outside, it's bright white, it's brilliant. On the inside it's warm and we shared a camaraderie with our Russian cosmonaut friends. We talked about their life aboard Mir and it was like a home to me."

Kondakova remembered the STS-63 rendezvous from a different perspective, as she was in the middle of a six-month Mir stay.

"Two years ago I saw Eileen and Michael Foale only through a window. I didn't think I'd come back to my home with American guys. But now we are together. We had a good program. We had many

experiments. It was a good time for all of us."

Mission Specialist Jean-François Clervoy, however, remembered seeing Mir for the first time.

"What I saw was like a shining diamond in the shape of a flower with the modules shining like petals," he said. "We worked a lot of payloads that were very interesting, especially the Biorack where the direct result of our handling of the samples."

Mission Specialist Carlos Noriega commended the training team for preparing the crew for any contingency, but noted that *Atlantis* was virtually trouble-free throughout the flight.

"We were ready for anything that could happen up there," Noriega said. "Luckily we really didn't have anything to challenge our knowledge skills."



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Editor Kelly Humphries
Managing Editor . . . Karen Schmidt

Cafeteria grand opening features enchilada special

(Continued from Page 1)

To kick-off the grand opening, the JSC Bldg. 3 Cafeteria will have a chicken enchilada lunch special (two enchiladas, picante sauce/sour cream, rice, beans, and guacamole for \$3.70) on June 16. In addition, customers who purchase one of the daily specials (\$3.50 or equivalent) during the week of June 16-20 may enter their names in a drawing for a 10-cup Krups Espresso machine. The drawing will be held June 20.

For more information about the retail store's grand opening or silent computer auction visit the Exchanges' home page at: <http://www4.jsc.nasa.gov/ah/Exchange/Stores.htm>